

國立臺北科技大學

106 學年第一學期電機系博士班資格考試

控制系統(大學部) 試題

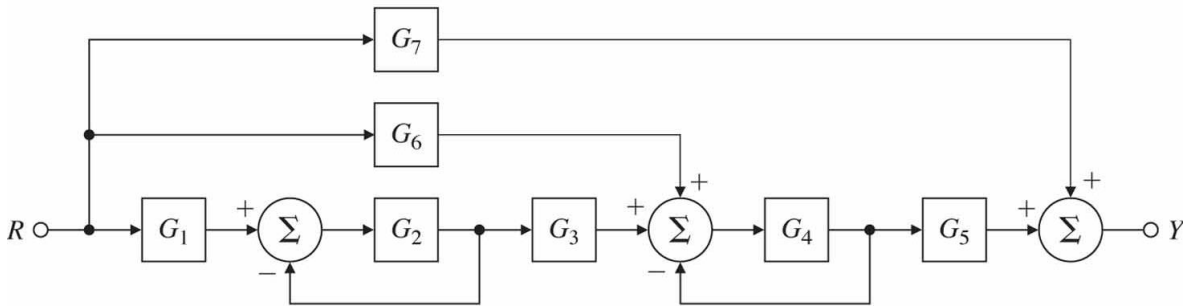
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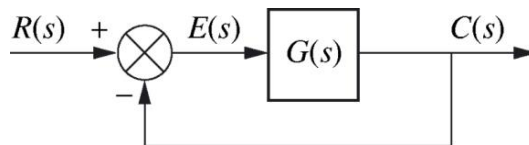
注意事項：

1. 本試題共 5 題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在試卷答案欄內，否則不予計分。
4. 考試時間：二小時。
5. 可用計算機。

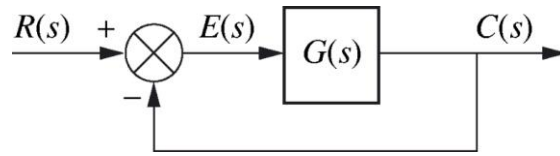
1. (20%) Find the transfer function for the following block diagram.



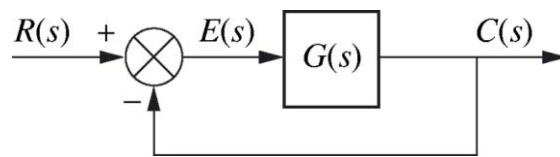
2. (20%) Find the range of K for which the system is stable if $G(s) = \frac{K}{(s+1)^3(s+4)}$.



3. (20%) Sketch the root locus for the system with $G(s) = \frac{K(s+2)(s+1)}{(s-1)(s-2)}$.



4. For a unity feedback system with $G(s) = \frac{K}{s(s+5)(s+15)}$, design a PD controller to reduce the settling time by a factor of 4 while continuing to operate the system with 20% overshoot.
- Find the location of the compensator zero. (10%)
 - Find the system gain. (10%)



5. (20%) For the system in the figure, what relationship exists between b_1 and b_2 to make the system not completely controllable?

